TUBULAR MESH SCREEN

Field of the Invention

[0001] This invention concerns the use of mesh to form a screen in a gutter. It is particularly applicable, although not restricted to, the use of mesh made from plastics materials to screen the gutter along the edge of a roof of a building for the purpose of preventing the entry of unwanted materials such as sticks, leaves, fruit, nuts and other tree debris, large insects, litter and the like into the guttering. The mesh may also serve as a barrier to birds and small animals such as rats and possums from entering the roof cavity of the building.

[0002] In some places such a gutter is called guttering and spouting, but the general shape remains the same being a thin-walled open topped channel, usually made of metal or plastics material, positioned to collect rainwater as it runs off a roof and gently sloped to deliver the water to one or more discharge points.

Background to the Invention

[0003] It is well known that the collection of unwanted materials in roof gutters causes overflowing of the guttering, blockage of the outflow pipes, constitutes a fire hazard and contributes to corrosion of the gutter. It also contaminates any water collected from the roof for drinking or other domestic purposes.

[0004] Many systems are in use, and more have been proposed, which provide a screen of mesh to cover the top of the gutter. One particularly successful method of covering gutter with mesh is described in the present applicant's Australian Patent No. 726947. That method involves running a strip of mesh, 25cm to 100cm wide, for the full length of a run of gutter and affixing one longitudinal edge of this strip to the roof material and the opposite edge of the mesh strip to the upper outside edge of the gutter. Such a system is shown in Figure 1 of the present specification.

[0005] US5,956,904 describes a dual screen which is inserted into the upper part of the gutter. The dual screen is in strip form and is somewhat wider than the gutter width. The screen is flexed so as to adopt an arcuate working position spanning the gutter. This is satisfactory so long as the gutter does not change shape when brimful of water during downpours or when compressed by tradesmen's ladders. Such forces tend to dislodge the free edge of the screen.

[0006] The mesh in such systems must be kept somewhat tensioned between rigid fastenings on the roof and the top outer edge of the gutter in order for the leaves and sticks to slide over the edge of the gutter. While such installations are very effective, their success relies upon skilled installation, the cost of which many potential users would prefer to avoid.

[0007] Many do-it-yourself screening systems are marketed which use a strip of mesh which is placed into the gutter in the shape of an inverted channel. Such an arrangement is shown in Figure 2 of the present specification. These systems can appear to be effective for a short period but, typically after a few months, the mesh sags or bends away from its original shape, curling over and/or collapsing into the gutter, or animals or birds pull it out of the original position, and the mesh is no longer effective for its purpose.

[0008] Typically the aperture size of the mesh used in such user-installed systems ranges from about 15mm to about 5mm, whereas for mesh used in the professionally installed systems, the aperture size is typically in the range from about 5mm to about 2mm. For the coarser sizes, the holes in the mesh are so large that mush material passes through. This material often blocks downpipes and drains, can build up in the gutter and can also contaminate water stored in tanks.

[0009] A more important problem about large sized mesh however is that sticks and leaf stems easily become caught in it. Trapped in this way, they protrude up from the mesh thus creating a barrier to the escape of other debris and the mesh thus provides a solid anchor for the build-up of further debris around the gutter area on a roof. A further disadvantage of larger mesh sizes for do-it-yourself installations is that there is less strength available from the plastic stands so there is an increased tendency for the mesh to collapse.

[0010] Meshes used in user-installed systems are often thin and flimsy so that they protrude out and up from the gutter or they are easily dislodged thereby allowing unwanted entry of debris and look unsightly.

[0011] With meshes having the smaller aperture sizes, leaves and sticks are not so readily caught, but water running from the roof has a much greater tendency for "sheeting" or running over the top of the mesh rather than falling through the apertures into the gutter. The choice of aperture size can thus

greatly affect performance of a mesh.

[0012] Some meshes used in user-installed systems come only in fairly short (about 1 metre) lengths and the "cut" ends easily dislodge and come out of the gutter.

[0013] An aim of the present invention is to provide a mesh and a gutter screening system which is suitable for do-it-yourself installation and alleviates disadvantages of the prior art.

Summary of the Invention

[0014] Accordingly, in one aspect the present invention provides a screen placed within a gutter, said screen comprising a tubular sleeve of mesh, said sleeve at least substantially filling the gutter.

[0015] In another aspect, the invention provides a tubular sleeve of mesh of plastics material for positioning within a gutter to prevent the entry of unwanted materials into the gutter, said mesh comprising a first array of parallel strands aligned in a first direction integrally moulded with a second array of parallel strands angularly offset to the first array, said strands defining mesh apertures therebetween.

[0016] In a further aspect, the invention provides a method of preventing the entry of unwanted materials into a gutter, said method comprising fitting into the gutter a tubular sleeve of mesh, the length of which extends along the gutter, whereby the sleeve at least substantially fills the gutter.

[0017] The gutter may be positioned on an outside edge of a roof of a building. The mesh may be formed of metal, but is preferably a screen formed of plastics material.

[0018] Alternatively, the gutter may be at or near ground level and may be let into the surface of a driveway for motor vehicles, swimming pool surround, walkway or the like.

[0019] The sleeve preferably extends continuously along at least substantially the full length of said gutter.

[0020] The mesh preferably comprises a first array of strands aligned in a first direction overlaid

by and adhered to a second array of strands aligned approximately at right angles to said first direction. More preferably, the mesh comprises:-

[0021] a first array of parallel strands, hereinafter called longitudinal strands, aligned in the longitudinal direction of the sleeve, and

[0022] a second array of parallel strands, hereinafter called circumferential strands, integrally moulded with and aligned at right angles to the first array, said first and second arrays of strands defining mesh apertures therebetween.

[0023] Preferably, the apertures are sized between 2.5mm and 4.0mm in a first direction and between 3.5 and 6.0mm in a second direction transverse to said first direction.

[0024] The strands in said first array may be spaced closer than the strands of the second array. The apertures through the mesh may be of generally elliptical shape which is longitudinally aligned in the direction of the second array.

[0025] The ends of said sleeve may be closed in order to prevent ingress of debris to the interior of the sleeve. Such closure may be by fastening the end of the sleeve flat, with or without first folding the end over. Alternatively, the closure may be achieved by trimming the end of the sleeve to form a flap which is then folded over to a position about transverse to the longitudinal axis of the sleeve where it is then fastened across the end of the sleeve. The fastening may be by any suitable means, such as by staples, clips or adhesive.

Brief Description of the Drawings

[0026] In order that the invention may be more fully understood, there will now be described, by way of example only, preferred embodiments and other elements of the invention with reference to the accompanying drawings, where:-

[0027] Figure 1 shows diagrammatically an installation of a mesh to the outside edge of a corrugated steel roof in accordance with one form of the prior art as discussed earlier in this specification;

[0028] Figure 2 shows diagrammatically an installation of a mesh to the gutter of a roof in accordance with another form of the prior art as discussed earlier in this specification; and

[0029] Figure 3 shows an installation of a mesh sleeve in a length of gutter in accordance with one embodiment of the present invention.

[0030] Figure 4 shows a portion of mesh suitable for the installation of Figure 3.

[0031] Figure 5 is an enlarged plan of a fragment of mesh with apertures approximately to scale.

[0032] Figure 6 is a perspective view of the tubular screen.

[0033] Figure 7 is a diagrammatic view of a flat strip of mesh being rolled into a tube prior to closing the seam between opposed edges.

[0034] Figure 8 shows the tubular sleeve collapsing as it is wound on to a reel.

[0035] Figure 9 shows a sectional perspective of the tubular sleeve in use as a drain liner.

Detailed Description of the Prior Art

[0036] Referring to the prior art installation shown in Figure 1, the edge of a roof has corrugated steel sheet 11, fascia 12, soffit 13 and gutter 14. A panel 15 of mesh is fixed over the gutter to prevent the entry of unwanted materials. The panel 15 is formed by unrolling a roll of mesh along the length of the gutter and attaching one edge of the mesh to the roof and the other edge to the gutter. The panel 15 is attached to the roof by one long edge 17 of the mesh panel being cut and tailored and attached to the roof with appropriate cleats or clips 19 screwed through the mesh onto every high point of the roof metal sheet 11. The opposite long edge 21 of the mesh is attached to the outer lip 23 of the gutter by screws. The lip 23 forms the top outside edge of the gutter 14 and lies at the top of the gutter outer face 20.

[0037] Referring to the prior art installation shown in Figure 2, a long strip of mesh 28 is folded into an inverted U-shape and pushed into the gutter 14 so that one edge portion 30 of the mesh rests

against the inside face of the inboard wall 34 of the gutter, the opposite edge portion 32 rests against the inside face of the outboard wall 36 of the gutter 14, and the central portion 38 of the mesh is held generally horizontally across the top of the gutter.

Description of the Preferred Embodiment and Other Examples of the Invention

[0038] Referring to Figure 3, within the gutter 14 rests a tubular sleeve 40 of mesh moulded of polyethylene. In other embodiments, the sleeve may be formed from metal mesh. The sleeve 40 presses into face to face contact with the inboard and outboard walls 34 and 36 and in face to face contact with the bottom wall 37 of the gutter. The uppermost portion of the sleeve 40 is held generally horizontally across the open top of the gutter, pressing into contact with the metal sheet 11 which tends to hold it down into the gutter.

[0039] As shown in Figure 3, the mesh which forms the sleeve 40 has an integrally moulded semi-rigid tubular form. It is preferably formed from a plastics material. A suitable material for the mesh is a high density polyethylene with conventional UV stabilising additives. In localities with a high fire danger, the material preferably includes a fire retardant so the material is self-extinguishing.

[0040] The sleeve 40 has a diameter of about 110mm in order to suit the most popular size of roof gutter used in Australia, but the appropriate size can be chosen to suit the end use. It can be supplied to the installer with the sleeve flattened and then rolled in the manner of a fabric fire hose. When unrolled, it tends to expand into its tubular form and this is encouraged by manual squeezing during the installation.

[0041] As an alternative to the tubular form being integrally moulded, the mesh may be moulded in a planar form and the longitudinal edges thereafter connected by fusing or otherwise fastening to produce the tubular structure.

[0042] The mesh as installed has an outside face 52 and inside face 54. The outside face 38 of the mesh is flat apart from minor irregularities due to non-uniform shrinkage of the plastics material as it solidifies during manufacture. Parallel strands 42 in a first array run longitudinally of the tube so, when it is installed, the strands 42 run in the direction of the length of the gutter 14. Parallel strands 44 in a second array run circumferentially of the mesh so, when installed, they run in the direction of

the width of the gutter.

[0043] Where the strands 42 and 44 intersect, that intersection may be heavily gusseted in the plane of the mesh, thus rounding off the corners of the apertures. The apertures 48 in the mesh would accordingly be of a generally circular, elliptical or oval shape. The gusseting provides a strengthening feature to the mesh which increases its resistance to tearing, splitting and sagging. This feature is shown in Figures 4 and 5.

[0044] Typical dimensions for the preferred mesh are:-

[0045]	centre to centre spacing of longitudinal strands 42	3.5 to 6.0mm
[0046]	centre to centre spacing of circumferential strands 44	2.5 to 4.0mm
[0047]	thickness of mesh	2mm

[0048] The strands 42 do not protrude from the outside face 52. The smooth outside face 52 on the mesh provides the tendency of debris to slip off the mesh. In localities with a high fire danger, the mesh material preferably has a self-extinguishing fire retardant characteristic which desirably conforms to a fire rating of 3 when tested according to Australian Standard AS1530 Part 2.

[0049] The ends of said sleeve are closed shut in order to prevent ingress of debris to the interior of the sleeve through the open end if it happens to become displaced from the end of the gutter. Most conveniently, such closure is by simply flattening the end of the sleeve and stapling, clipping, taping or otherwise adhering the end of the sleeve flat, with or without first folding the end over. Alternatively, the closure may be achieved by trimming the end of the sleeve to form a flap which is then folded over to a position transverse to the longitudinal axis of the sleeve, whereupon the flap is then fastened across the end of the sleeve.

[0050] The sleeve forms a tubular sock which is not easily dislodged from the gutter, thereby ensuring no penetration of unwanted debris into the gutter channel.

[0051] Even if the exposed top of the sleeve mounted within a gutter becomes covered with leaves, a completely clear tunnel is maintained along the centre of the sleeve, so allowing free-flow of

water within the sleeve. This shape is evident in Figure 6.

[0052] A panel may be cut from the sleeve at the place where it passes over a downpipe or other drain pipe for removal of water from the gutter. In this way, the water flowing down the inside of the sleeve has an unrestricted aperture to pass from the gutter into the drain pipe.

[0053] Some guttering constructions utilise supporting brackets which are external to the guttering channel and such brackets cause no obstruction to the sleeve of mesh pushed into the guttering. However, some constructions of guttering have supporting brackets which are internal to the channel, with such brackets being nailed to the building's fascia 12 through the inboard wall 34 of the guttering and the other end of the brackets engaging the internal surface of the outer lip 23 of the guttering. Where the brackets are such internal brackets, the sleeve needs to be slotted at the appropriate places on its lower portion in order to accommodate the brackets. Such slots 56 are shown in Figure 6.

[0054] Figure 7 shows a strip of mesh being closed into a tube by fusing the meeting edges.

[0055] The mesh tube is inherently resilient and may be flattened for rolling on to a reel 58. When unrolled, the tube reforms as shown in Figure 8.

[0056] When as in Figure 9 the mesh tube is used as a drain lining, the advantage of the resilience is that it tends to fill the volume of the drain 60 minimising the space 62 where debris can lodge.

[0057] Whilst the above description includes the preferred embodiments of the invention, it is to be understood that many variations, alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the essential features or the spirit or ambit of the invention. For example, although the above descriptions refer to strands having a generally circular cross section, it will be understood that they may alternatively be elliptical or even of squared or flattened cross section. Also, the moulding or forming operation to manufacture the mesh may also cause the strands at the crossing points to be slightly bulged, or to be flattened slightly, and mesh so produced will be understood to also fall within the

scope of the invention.

[0058] Also, although the preferred form of mesh is constructed as a pair of intersecting arrays of parallel strands, the mesh may alternatively take the form of a mat of randomly aligned fibres adhered to each other. In such an embodiment, the sleeve would have a substantially greater wall thickness than the sleeve of the preferred embodiment. The mat thickness could comprise up to 20% of the diameter of the sleeve.

[0059] Also, although the preferred mesh is formed of plastics material, the mesh may alternatively be woven from metal wire or formed by a multitude of perforations through a metal sheet. The apertures may take the form of round or generally square holes, ellipses, slots or holes of any other shape desired. Both versions exhibit shape "memory" and stay in position in roof gutters for long periods without attention. They are easily cleared with a hose.

[0060] Although the invention is described particularly in relation to roof gutters, it is also applicable to other gutters such as those formed as channels in concrete or other paving. Where used in places like driveways or paths, the sleeve would preferably be overlaid by a rigid structural grid to prevent downward loads flattening the sleeve within the gutter.

[0061] It will be also understood that where the word "comprise", and variations such as "comprises" and "comprising", are used in this specification, unless the context requires otherwise such use is intended to imply the inclusion of a stated feature or features but is not to be taken as excluding the presence of other feature or features.